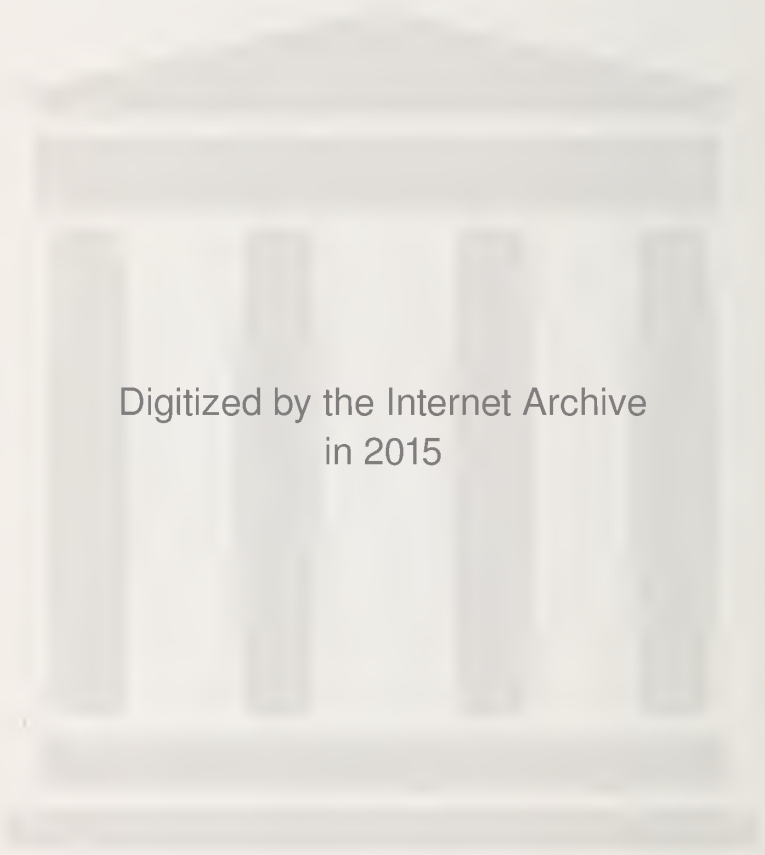

Progress in Farm Research---1947

Different kinds and amounts of fertilizer and different methods of application are tested as a background for the growing use of fertilizer on corn.

SIXTIETH ANNUAL REPORT

OF THE

AGRICULTURAL EXPERIMENT STATION

UNIVERSITY OF MARYLAND
COLLEGE PARK, MARYLAND
1946-1947

The Station is located on the B. & O. R. R., City and Suburban Electric Car Line and the Baltimore-Washington Boulevard, eight miles North of Washington, D. C. Telephone—Warfield Exchange.

Visitors will be welcome at all times, and will be given every opportunity to inspect the work of the Station in all its departments.

The Bulletins and Reports of the Station will be mailed free of charge to all residents of the State who request them.

ADDRESS:

AGRICULTURAL EXPERIMENT STATION
COLLEGE PARK, MARYLAND

To the Governor of Maryland, the Board of Regents, and the President of the University of Maryland.

I transmit herewith the Sixtieth Annual Report of the University of Maryland Agricultural Experiment Station, as established by Act of Congress, March 2, 1887, containing an account of research and experiments conducted during the fiscal year ending June 30, 1947, and a statement of the receipts and disbursements for the same period.

W. B. KEMP,
Director.

UNIVERSITY OF MARYLAND

AGRICULTURAL EXPERIMENT STATION

Volume 60 1946-47

Progress in Farm Research---1947

Sixtieth Annual Report

For the Fiscal Year ending June 30, 1947

By W. B. KEMP, *Director*

DURING the past year provision has been made for increased facilities in research.

Work is under way to expand the laboratory accommodations in both dairy nutrition and dairy manufacturing within the present dairy building. This expansion will provide much needed facilities for research now in progress in that department.

The Governor and Legislature provided funds in the bond issue for a tobacco research farm in Southern Maryland and a farm in the southern part of the Eastern Shore for work with poultry and the vegetable crops of that area.

For many years the tobacco research program has been conducted in cooperation with the Federal Government on rented land where facilities have been inadequate. Southern Maryland tobacco growers have desired an enlarged program that would include curing, housing and labor-saving devices as well as field studies of production. The new land and buildings should permit expansion of both the state activities and those in cooperation with the Federal Government.

Eventually the farm on the southern Eastern Shore, probably near Salisbury, will serve as a site for the Livestock Sanitary Service laboratory as well as for a broiler production unit and for horticultural research.

FACTS IN FARM ECONOMICS

FARM MANAGEMENT

Pattern of Maryland Agriculture—An appraisal of the situa tion indicated that there would be a heavy demand for cereal and fats for war relief throughout the first half of 1947, bu that demand for agricultural products might decrease during th second half of the year.

Poultry, the leading income producing enterprise in the State was expanded during the war and considerable curtailment i expected in 1947. Dairy production continues to increase, but a a slower rate. The major changes will be an increase in produc tion of milk per cow, more home-grown feed, especially gooc quality roughage. Some increases are indicated also in the acre ages of wheat and tobacco.

At one time strawberries were an important crop on the East ern Shore, but the shortage of labor and ravishes of disease re duced the acreage from 12,800 in 1927 to less than 2,800 in 1946 A new variety, the Temple, has given favorable results and the planting of 4,000 acres in 1947 is the objective.

Recommended changes in acreages of crops are for less Irish potatoes, sweet corn, snap beans, cantaloupes, and watermelons.

Farm Mortgage Financing—The total mortgage debt has con tinued high in recent years in spite of the large volume of mort gages paid off. Farm transfers have been numerous. Many of the transfers have been for cash, or with a small mortgage, but others have been financed with an unduly heavy burden. Farms with a small owner equity may create serious debt adjustment in the event of a recession.

Farm mortgage debt in Maryland increased from 1939 to 1941. From 1942 to 1944 the debt decreased annually, but since 1944 it has been increasing. The low point in farm mortgage debt during the war was $42,894,000 in 1944. In 1946, the debt had risen to $44,501,000.

Father-Son Partnerships—Most partnership agreements are verbal and loosely devised. Written agreements are almost non existent, but would appear to be far more satisfactory and cause less trouble in arriving at a final division of receipts and ex penses.

Father-son partnerships often start by way of 4-H club work, where the son owns one or more head of livestock, or a small acreage of crops. The son works gradually into a more perma nent partnership.

Several major features are required in any successful father-son agreement for farm operation. Some of these are: The farm must be large enough to support two families; the father and son must be able to "get along" and to discuss their mutual problems; the agreement must give the son a share in all of the farm enterprises; the agreement must be acceptable to all members of the family, especially if there are other children; the agreement should be written, and accurate farm records must be kept; plans must be made for separate homes for each family in case the son is married; receipts and expenses must be shared in proportion to the responsibility and contribution of each party.

How Rural Negro Families Live—Information on the economic and social status of rural Negro families was obtained from a study of their home facilities, tenure, incomes, size of family, participation in community activities, rural-urban migration, and the amount of products grown, canned for home use and sold.

On most of the farms studied, the farm houses were unpainted and had few modern conveniences for storing and preparing food, doing laundry, or sewing clothes. Few of the homes were complete with bathrooms. A small percentage of the families received newspapers, magazines, or agricultural bulletins; however, 65 percent had radios. The church was reported as the center of community activity and offered the best channel for reaching Negro farm people.

Rural Negro families reported that 26 percent received help from either the Extension Service or vocational agriculture teacher. Few recognized the names of the agency, but knew the particular worker. Persons in the higher income groups frequented the clinics, attended meetings and received educational help from the Extension Service, but the low income groups were not being adequately reached.

Rural non-farm Negroes need extension service assistance in the production and preservation of food and in home furnishing and management. Most of the non-farm families had gardens and, in general, processed more food for winter use than was done by farm families. The degree of deterioration of houses occupied by non-farm Negroes was judged by the condition of the roof and foundation. The roof leaked on 21.2 percent of the houses, and 10.4 percent had crumbling foundations. Families with low incomes lived under adverse conditions, 40 percent reporting leaky roofs and 95.5 percent having no bathroom facilities.

Labor Utilization in Dairy Buildings—Records on 15 farms where milk production is the major farm enterprise and studies of the dairy unit on each farm show present methods used in

doing chores, work routine, building layout, flow of materials, integration of jobs, use of equipment, unnecessary travel, and wasted motion.

Milking was the most time-consuming of the dairy chores, requiring 9.7 minutes per cow. Labor was reduced 39 percent where milking machines were used. Further savings were made by practicing the system of fast milking.

Silage and grain feeding were expedited by using a cart. In reorganizing a barn, the use of a cart in feeding silage eliminated 83 percent of the walking done previously in the operation.

Farmers have developed many novel things to reduce the amount of labor used. Information was secured to show comparative results of forks for handling silage, scoops for grain, scrapers for cleaning barns, mechanical hoists for lifting cans, carts for hauling feed and milk, and the use of manure loaders.

Insurance Carried by Farmers—An indication of the kinds and amounts of insurance carried by farmers was obtained from records of insurance companies.

All types of insurance coverage on motor vehicles (known as complete coverage) were carried in 1946 on about 10 percent of the trucks and 25 percent of the automobiles of farmers. On about one-half of the trucks and one-third of the automobiles, public liability was the only form of insurance carried. About 75 percent of the public liability policies on trucks and 85 percent of those on automobiles contained the $10,000/20,000 provision. The 80/20 collision provision was the most popular form of automobile insurance, but the $50 deductible was the principal type of collision on trucks.

Analysis of a portion of the fire insurance policies covering farm property (except motor vehicles) shows that relatively few farmers carry coverage on all kinds of property in one policy. The first 352 policies analyzed, covering property on 275 farms, show a total of $1,603,000, or $6,000 per farm. Nearly 40 percent of this total was on farm dwellings, 33 percent on personal property, and 27 percent on farm buildings other than dwellings.

FARM TAXATION AND FINANCE

Record Keeping for Income Tax—The majority of farmers do not have adequate records for reporting their farm income. They are not familiar with the methods of determining farm profit correctly, and complicated schedules are confusing to them. These conditions emphasize the need for improvements in farm record keeping; better organization of the data required on farm schedules for income tax; clarification of instructions on farm schedules; and a better understanding by farmers of the computations in arriving at farm income.

Farm Forestry Taxation in Maryland—Woodland property taxes per acre in Maryland in 1946 varied from 9 cents in Garrett to 29 cents in Howard County. Total property taxes levied against forest properties during the 30 years, 1917-1946, averaged from $3.61 per acre in Garrett to $8.70 per acre in Howard County. In some counties the woodland assessment rate averaged only one-fifth of the tillable land rate; in other counties it was nearly one-half the rate on tillable land.

Three general methods of assessing woodland are used in Maryland. One system is that of rather uniform rate assessment throughout a county. Another system is an attempt to vary the woodland assessment rate among farms according to many factors influencing the current values of forest land. A third method provides for increasing the assessment as the timber matures and lowers it to a minimum when the timber land becomes cut-over land.

Special tax treatment of forest properties has been tried for nearly a century. Thirteen states have forest yield tax laws, and 13 other states provide other forms of special taxes against such properties. Most of these laws are optional to owners and require special qualifications and forest practices. Measured in terms of application, they have not been too successful.

Some of the forest tax difficulties could be lessened by better property tax assessment procedure. Use of some modified property taxing method, such as the adjusted property tax, the deferred timber tax, or differential timber tax, also has practical possibilities.

MARKETING FARM PRODUCTS

Transportation of Farm Products and Farm Supplies—A study of transportation of farm products and farm supplies by motor truck indicates that the trucks are empty during nearly one-fourth of the mileage.

About one-third of the trucks hauling farm products on Maryland highways were hauling fresh fruits and vegetables, and another third were transporting livestock, poultry and livestock and poultry products. Farm automobiles were used extensively in hauling farm commodities of high intrinsic value, such as milk and berries, short distances to local markets or concentration points.

Forty percent of the vehicle loads of farm products delivered to concentration points were transported by farmers' standard trucks, 25 percent by farmers' pick-up trucks, and 20 percent by automobiles. Commercial vehicles for hire carried an average of 4,445 pounds of farm products per load as compared with 3,196 pounds for farmers' regular trucks, 748 pounds for pick-up trucks, and 269 pounds for automobiles. The tonnage of farm

products hauled on farms mostly from fields to buildings, was about 80 percent greater than the tonnage of farm products hauled to market.

Prices Paid by Farmers—Expenditures by farmers in Maryland for family living averaged $1,278.65; for farm production, $4,872.77; and for total expenditures the average was $6,151.42 per farm. Annual expenditures of farmers for the year 1944-45 were as follows: All food, $324.00; tobacco, $40.08; men and boys' clothing, $97.55; women's and girls' clothing, $96.58; children's clothing, $55.48; dry goods, $25.51; furniture, $105.38; floor coverings, $30.25; household equipment, $70.87; household articles, $28.60; building materials for house, $158.48; building materials for barn and sheds, $178.59; feed, $1,364.40; fertilizer, $315.20; seed, $177.08; farm equipment and supplies, $895.68; farm power supplies, $414.32; fuel and light, $191.31; farm machinery purchases, $446.65; farm machinery repairs and parts, $195.01; tractors, $1,013.67; motor trucks, $810.95; automobiles, $639.81.

LAND ECONOMICS

Farm Tenancy—Leasing arrangements in Southern Maryland are influenced by day-to-day bargaining between landlords and tenants. Two factors influence the final lease agreement—bargaining power and custom. Some of the problems arising between landlords and tenants are: Number of tobacco plants to grow; neglect of farm work for off-farm employment; and desire for a change in the share of receipts or expenses originally agreed upon. These problems are difficult to adjust to the satisfaction of both parties. In some states, where landlords desire increased production of tobacco, customary arrangements are being supplemented by special incentives.

Trends in Farm Real Estate Values—The farm real estate market continued quite active to June 30, 1946, in all areas of the State. The trend for the first half of 1946 indicates greater activity in the market than for 1945, as evidenced by the total number of transfers and total acres transferred. The total number of transfers in all areas of the State was 592 for the first half of 1946, or 62.2 percent of all transfers for the year 1945. Acres transferred by voluntary sales through June 30, 1946, were 71.5 percent of the acres that were transferred by this method for the year 1945.

For the State as a whole, land values increased from an index of 91 percent in 1936 to 107 percent in 1940. Since 1941, values have advanced in all areas of the State, but at different rates. On June 30, 1946, the index of land values for the Upper Eastern Shore was 162, as compared with 292 for the Southern Maryland area. The index value for the State as a whole had advanced

to 191 percent on June 30, 1946, of the base period, 1936-1940—100.

Farmers should exercise caution in buying farms at greatly inflated prices. Those contemplating the purchase of farms should have expert appraisals made, based upon normal yields and normal values over a long period of time.

AGRICULTURAL ENGINEERING

Grain Storage on the Farm—Corn can be dried effectively in a drier of the type developed by this department when proper coils are used, but somewhat slower than small grains, such as wheat.

Sweet Potato Curing and Storing—Sweet potatoes were again stored in two houses with different humidities during the storage period and other factors as nearly alike as possible. In each house both Maryland Golden and Orange Little Stem potatoes, harvested on the Station farm, were stored with a variety of pre-storage treatments.

Orange Little Stem potatoes grown in Anne Arundel County were cured at two temperatures and stored at three temperatures in six compartments.

There was considerable difference between the storage reaction of the 1946 crop as compared with that of 1945. Reasons for the difference were not determined.

No significant difference in keeping quality due to the various pre-storage treatments was observed.

Except for black rot, there was little loss due to rots in either house. Black rot did not spread from potatoes produced at the Station to potatoes produced in Anne Arundel County, even though stored in adjacent baskets in the stack.

Weight loss was slightly less at the higher humidity, but rot losses were enough greater so that the total losses were not significantly different.

In the compartments, weight losses tended to decrease with decrease in both curing and storing temperatures, but total storage losses for the season were substantially constant.

FARM CROPS AND SOILS

Wheat—Hybridization and Selection—Currently recommended varieties of wheat, such as Leapland, Thorne, Nittany and Mammoth Red, a few old-time varieties no longer recommended, miscellaneous varieties, and several mixed populations carried for natural selection were tested at College Park and at Ridgely. Twenty-three varieties were compared at College Park and 8 of the same varieties at Ridgely.

The highest yield at College Park was 30.9 bushels per acre for Leap 53 and Yorkwin; the lowest was 25.6 bushels for Mam-

moth Red. Redhart, an early variety with short straw, yielded o a level with the best varieties. This is contrary to its record th preceding year, when its yield was definitely lower than a others.

Better yields were obtained at Ridgely than at College Park The highest yield was 41.7 bushels per acre for Thorne, and th lowest was 32.7 bushels for Valprize. Redhart made 38.1 bushel per acre.

Hybridization for Smooth Awns in Barley—Wong barley wa the outstanding variety in tests at College Park with a yield o 52.6 bushels per acre. It out-yielded its nearest competitors (Ten nessee Winter and Kentucky No. 1) by 11.7 bushels per acre. Al varieties showed excessive lodging (25-95%), but Wong was lov with 25 percent. Lee oats was more productive than any of th barley varieties. Its yield was equivalent to 58.8 bushels per acr of barley. In more severe winters this relationship would not b expected to exist.

Tennessee Winter tied with Wong at 41.3 bushels per acre fo first place in Ridgely. At present, however, Wong is the predom inant variety of barley in the State. Its popularity is due to it productivity, stiff straw and head type.

Winter killing was negligible in the nursery test for winte hardiness. Only one of the 39 strains under observation had mor than 5 percent winter killed plants.

Soybean Production in Maryland—Yields of soybean varietie tested at College park ranged from 11.5 bushels per acre fo Wilson 5, a forage variety, to 19.4 bushels for Mingo. Recom mended grain varieties gave the following yields; Earlyana, 15.4 bushels per acre; Lincoln, 18.5 bushels; Illini, 15.9 bushels; an Scioto, 16.9 bushels.

Sweet Corn Seed Production and Breeding—Five out of 3 experimental crosses of sweet corn (all yellow) appeared quit promising in 1946 tests, from the standpoint of yield, size, ap pearance, and kernel quality. All will be included in the test i 1947 for further study.

Several new out-of-state yellow hybrids were outstanding fo yield and size of plant in the tests. One new commercial Ever green hybrid was promising in its class. Country Gentleman hy brids released recently from the Illinois and Indiana stations ap peared suitable for use in Maryland. Seneca Chief, a commercia yellow slightly earlier than Golden Cross Bantam, continued t show exceptional tenderness and flavor. Although its tonnag was below that of the older hybrid, it was ahead of it in numbe of marketable ears per acre. Its 3-year performance justifies it

use in home gardens and in market gardens catering to a fancy trade.

Forty-one Maryland lines were carried in the nursery and the more promising ones were used in making experimental crosses to be tested in 1947. A test including 64 entries representative of the principal types of sweet corn used in the state was conducted at College Park. Some 50 additional entries from miscellaneous sources were carried in observation rows. Twenty hybrids were grown and studied for freezing and canning quality, in cooperation with the Department of Horticulture.

Results of this work are presented each year at the canners' meeting. The canners determine in large measure what hybrids are to be grown on Maryland's 40 thousand acres of sweet corn for processing.

Development of Dent Corn Hybrids Specifically Adapted to the Corn-Growing Areas of Maryland—Results of this work not only exert a strong influence on present use of hybrid corn in Maryland, but also provide a basis for breeding better hybrids for the future. By conservative estimate, the hybrids recommended as a result of the work increase yields at least 5 bushels per acre over the varieties replaced.

Ninety-three double-cross hybrids and 2 open-pollinated varieties were included in one or more of 9 regional tests. One 25-entry double-cross test and two 49-entry 7x7 lattice square uniform single row tests were conducted in cooperation with the Northeastern Corn Conference. Sixty-two experimental crosses involving Maryland lines were compared in the nursery for yield and standing ability. Standard inbred lines together with 62 local lines beyond the third generation of inbreeding were carried. Of the latter, 44 were isolated from the yellow variety, Golden Queen, and 18 from Johnson County White.

Root lodging and stalk breakage were prevalent, as in the preceding year. Consistent differences in standing ability continued. Hybrids Ohio C88, Ohio C12, Ohio C38, Iowa 4059, and U. S. 13 continued to be outstanding for the number of erect plants. Illinois 448, used as a late check and formerly regarded highly as a silage hybrid, showed 70 percent more lodging than did U. S. 13. Presence of the corn borer appears to be causing a change in the relative position of hybrids with regard to stalk breakage.

Several U. S. experimental hybrids, notably U. S. 505, were outstanding for productivity. Maryland inbred R35 continued to show prepotency for yield, but was disappointing for stalk quality and blight resistance.

On the basis of data collected in 1945-46, a revised list of recommendations will be made in 1947. By additions and substitutions of hybrids with superior records, the returns from hybrid

corn will be increased. Tests indicate that U. S. 13 and other Corn Belt hybrids are hard to beat in Piedmont and Western Maryland. On the Coastal Plain, however, the latter hybrids can be surpassed by hybrids better suited to the area.

Short Rotations—That aside from pasture and high protein concentrate, a dairy cow could be maintained on 1.2 acres, which would provide all grain, hay, silage and bedding, is indicated by results of a test of two-year rotations for dairy feed. Corn silage averaged a little more than 5,000 pounds of digestible nutrients; soybean-sorghum silage, 3,200 pounds; corn grain, 3,000 pounds; wheat grain and lespedeza hay, 3,053 pounds after corn silage.

Availability of Phosphate Materials—Very little difference was apparent in corn from various phosphorus carriers; wheat showed marked differences. Heavy applications of rock phosphate gave the best yields of corn and normal application of rock phosphate and gypsum gave lowest yields. For wheat, fused rock phosphate and ordinary superphosphate were the best two carriers and rock phosphate the poorest.

The slowly soluble or less soluble phosphorus carriers seemed to require a long-growing crop and rapidly decomposable organic matter to produce satisfactory yields. A short-growing crop, or a crop grown during cool weather in which there is little biological activity gives little response to the slowly soluble phosphorus.

Influence of Treatment on Organic Matter in Soil—Although plowing under organic matter appears to increase crop yields, there is apparently some question as to whether this method results in accumulation of organic matter in the soil.

Several methods of preparing a seed bed to leave the organic matter on the surface were tried. Where it was possible to kill and keep down new growth during the growth of cultivated crops, the plots which had the organic matter left on the surface by discing and similar treatment produced equal to the plots which had the organic matter plowed under. There was an indication that the organic matter decomposing on the surface had increased the organic matter content of the soil.

Effect of Fertilizer, Boron and Minor Elements on Alfalfa—Stands of alfalfa became so poor because of unsatisfactory lime conditions and unfavorable weather that plots started in 1940 and 1945 were discontinued in the fall of 1946.

Heavy application of potash and minor elements still continued to give the best yields. Use of boron, with and without potassium, did not give the stimulating effect that it had in the past. This was noted even with additional boron applications. Perhaps some other minor elements may be as deficient as boron was formerly.

The low cost of borax and high returns of alfalfa and ladino hay justify the recommendation of boron, even though it sometimes does not produce a great deal of stimulation. A source of minor elements appears to be definitely needed for some crops on many of our soils.

Comparison of Combine Type Grain Sorghums—Seven varieties of grain sorghums were compared in field plots and two varieties were planted with grain drills in 7-inch rows. It was the aim to obtain information regarding their value as a substitute for corn on droughty land, and also as a crop requiring less labor than corn.

Yields in bushels per acre for the row plots were as follows: Bonita Dwarf Hegari, 55.0; Plainsman Combine Milo, 50.7; Martin's Combine Milo, 41.5; Double Dwarf No. 38, 39.9; Early Hegari, 39.3; Woods Combine Milo, 38.5; Standard Hegari, 27.7. Martin's Combine Milo and Woods Combine Milo averaged about 9 bushels more on close drilled plots than on plots with 3-ft. rows and cultivated. All Hegari plots lodged much more than any others.

Variety and Fertilizer Tests of Rye—Five varieties of rye and one variety of winter wheat, with four fertilizer treatments of each, have been tested at College Park for the last six years on both heavy and light land.

Rye yields in 1946 were above average for the 6-year period. Soil type had little influence on yield for this season. Contrary to the period average, the two northern ryes, Rosen and Imperial, were slightly more productive than the southern varieties, Abruzzi and Balbo. Over the 6-year period the latter have averaged 5 bushels per acre more than the former. They have also been more consistent from year to year. Leapland wheat had about the same yield level as the ryes in these tests.

The 6-8-6 fertilizer, with half of the nitrogen applied in the spring, has led consistently in the test over the 6-year period. Yields from fertilizer treatments in 1946 were as follows: 6-8-6, 24.4 bus.; 2-12-6, 21.9 bus.; 0-8-12, 19 bus.; 0-20-0, 21.7 bus.

ANIMAL HUSBANDRY

A New Breed of Swine—Hogs of $\frac{3}{8}$ Berkshire and $\frac{5}{8}$ Landrace blood appear to be of satisfactory type, both from production and market standpoints. Foundation stock is being established at that level of breeding. Animals are being selected on the basis of color and type and the breed will be fixed at this level of Landrace blood until a large number of satisfactory breeding animals are available.

Litters were produced in the spring and in the fall as a resul of crossing the present foundation stock. Out of 15 fall litters gilts and 3 boars have been selected as replacements, bringing the herd of crossbreds to 22 sows and six boars. Two boars wil be sold to farmers who wish to use them for crossing with sow in their herds.

A further cross of Landrace blood may be introduced with a part of the herd on a purely experimental basis to determine whether addition of Landrace blood will be of benefit. If it proves beneficial, the next step will be to increase the percentage of Landrace blood in the new breed to 13/16, at which point further crossing will be discontinued and the breed established at that level of Landrace blood.

Boars are now being made available to farmers at reasonable prices for crossing with sows in their herds. This will enable them to take advantage of this cross-breeding investigation to produce market hogs of the meat type.

Wintering Rations for Pregnant Beef Cows—Beef cows can be wintered more satisfactorily on a roughage feed of corn silage, supplemented with soybean oil-meal and ground limestone, than on roughage of mixed hay, according to results of a comparison of the two methods. Both groups received additional grain after calving. The comparison included gains made, vigor and production of the animals. It appears that many Maryland beef cattle producers might use more silage to advantage in wintering their beef cow herds.

Influence of Energy Intake on Breeding Ewes—Results of the first trial and preliminary data from the second trial indicate that while ewes perform better on the higher energy levels, the returns have not justified the additional cost at present feed prices.

In these trials, three groups of ewes were fed at energy levels of 70, 90, and 110 percent of the Morrison feeding standards for pregnant and lactating ewes. The ewes were graded for condition and vigor at the beginning and close of the trial. Lambs were graded for condition and vigor at birth and at the close of the experiment. Ewes receiving the 110 percent energy level finished the winter feeding period in better condition than the other two lots in the first two trials, and ewes receiving 90 percent energy level were slightly fatter than the 70 percent lot. In the first trial, the lot receiving the 110 percent level produced heavier fleeces, raised a higher percentage of lambs, which made greater average daily gains and reached heavier weights than either of the other lots. The 90 percent lot was intermediate between the 70 percent and 110 percent lots in this respect.

CONTROL OF CROP DISEASES

Potatoes Improved by Spray—Results of a test in Garrett County indicate that potatoes in that region are improved by the use of a fungicide with DDT, as compared with DDT alone, regardless of the presence of late blight and other diseases.

Nine varieties of potatoes were used and the same seed was planted in all replications. They were all fertilized and treated alike except the application of different spray materials.

In spite of the fact that no late blight was observed in either plot, the yields from all varieties sprayed with Bordeaux plus DDT were larger than those sprayed with DDT alone. The difference in yield varied greatly in the different varieties.

Strawberries Resistant to Red Stele Disease—Although the Temple variety has proved satisfactory for commercial production and for long-distance shipping, attempts are continuing to increase red stele resistance and still maintain desirable fruit qualities.

From 5,000 seedlings planted in red stele infested soil at Pittsville, Maryland, 79 selections were made during the fruiting season of 1946. These selections were replanted for further testing.

Attempts were made to isolate the red stele organism from infested soil obtained from other states, but no pure cultures were obtained.

The selection Md. 683 has been found an excellent source of resistance to red stele and it produces a large number of promising seedlings when used as a parent. It was multiplied enough to give a good production record.

About 100 to 125 acres of the Temple variety were picked in Maryland in 1946. Most of this acreage was grown in soil infested with red stele, where profitable production by any other variety is impossible. The price for berries was unusually high and it is estimated that the Temple variety provided a gross return to Maryland farmers of at least $100,000 in 1946. In addition, there was a considerable sale of plants.

Disease Resistance in Potatoes—In the search for more disease resistant, better adapted, and higher quality potatoes, both new varieties and seedlings were tested in 1946. Thirty-three varieties and 86 seedlings, representing 76 different crosses were under observation during the season.

Menominee and Potomac potatoes gave highest yields in Garrett County, and again Menominee proved very resistant to scab. Good yields were obtained also from two promising blight resistant seedlings. Marygold gave the largest yield in Worcester County for the fifth consecutive year. Large yields were obtained

from Pontiac and a blight resistant seedling. Potomac is being recommended as the best variety for scab-free soils and Menominee as best for scab-infested soils in Garrett County. Marygold is recommended as the best early variety for planting in Maryland where its yellow flesh is not objectionable.

Approximately 1,000 bushels of certified Menominee potatoes and 500 bushels of certified Potomac potatoes were planted in Garrett County in 1946.

DAIRYING AND DAIRY PRODUCTS

Feeding and Management of Cows During Dry and Freshening Periods—Of major importance is the finding that cows suffering with a vitamin A deficiency were not more susceptible to development of ketosis than cows receiving an adequate intake of vitamin A.

Thirty-four cows received rations varying in protein, fat, carotene and soluble carbohydrate content during the last four months of pregnancy and the first month of lactation. Energy intake was varied, also. The effect of these rations upon the blood glucose, blood acetone bodies, blood plasma fat, blood plasma carotene and viatmin A, milk fat, milk production, and body weight was determined.

It was found difficult to maintain a high level of blood sugar following parturition, even with cows on high levels of energy intake. An unexpected development was the relatively high levels of blood glucose obtained on cows receiving a low-protein diet, even when the energy intake was cut to 50 percent during the three weeks following parturition.

Much of the work is too incomplete to warrant making general recommendations. However, the vitamin A work appears to settle completely the question as to whether ketosis is caused by a vitamin A deficiency. This should result in considerable saving to dairymen as a substantial sum has been spent and is being spent for a vitamin A concentrate to treat ketosis in dairy cattle.

Cows With Ketosis Are Studied—Methods for determination of blood plasma sodium and potassium of cattle have been developed and normal values established. By means of these methods, an effort is being made to find out if there is an abnormal balance of these substances in cows affected with ketosis. Not enough analyses of the blood of ketotic cows have been made to form a basis for conclusions, but preliminary work indicates that the sodium-potassium balance may not be abnormal.

Chemical Changes in Milk Fat as Related to the Flavor of Milk—Rancidity is the chief chemical off-flavor of raw milk and raw milk products. With a view to finding out the cause of rancid flavor in dairy products, extensive studies are being made of

the chemical changes in milk fat which contribute to, or are responsible for, that off-flavor.

An extraction procedure was developed for obtaining fat from milk for free fatty acid titration. This "extracted" fat gave titers approximately 30 percent higher than those for fat obtained by the standard churning procedure. Studies have been conducted on various methods of titrating fat for acidity. The most highly satisfactory method was found to be one in which the fat is titrated in a mixture of absolute alcohol and petroleum ether. Chemical analyses have been made with the view of ascertaining if the free fatty acids concentrated therein exhibit different characteristics than the original fat. The results reveal that although the alcohol extract is considerably higher in the lower acids than the original fat, the alcohol extract from rancid fat was not appreciably different from the alcohol extract of the non-rancid fat. Acetone fractionation of rancid and non-rancid fat has been resorted to, but the results are not yet conclusive.

CONTROL OF INSECTS

Codling Moth—Fruit growers of Maryland lost a minimum of 30 percent of their apple crop during the years 1940 to 1945. As a result of accurate timing and application of DDT instead of lead arsenate, this loss in 1946 was reduced to less than one-half of 1 percent.

Experiments in 1946 included 16 plots with six Stayman Winesap and three York Imperial trees on each plot. Various spray combinations of DDT, benzene hexachloride, DN-111 and lead arsenate were used, at different strengths, different timing, and the number of applications per plot varied from three to five.

DDT as a 50 percent wettable powder was far superior to any of the other materials used. Approximately 100 percent control of codling moth was obtained by use of either five applications at 1 pound per 100 gallons of spray or three applications using 2 pounds of DDT per 100 gallons of spray. Benzene hexachloride was the least effective of the materials used. Analyses of 350 samples of foliage and fruit from the different plots during the season furnished valuable information on the amount of deposit of DDT and lead arsenate necessary to kill codling moth larvae.

Japanese Beetle—Sprays of DDT and benzene hexachloride were both found effective for controlling the beetle when applied either with conventional equipment or airplane. Both wettable powders and emulsions were effective when used in conventional equipment and excellent results were secured by airplane when applied in oil solution. Promising results were obtained with DDT applied in a fog application. When operated

properly, specially designed Japanese beetle traps using DDT as a killing agent were found effective.

FRUITS AND VEGETABLES

Factors Affecting Maturity, Shipping and Storage Quality of Fruits—Work on the effect of different post-storage temperatures on firmness and quality was continued with Stayman Winesap. Immediately after harvest about one-half the fruits were waxed and all lots placed at 30-31°F. After 2½, 3½, and 4½ months of storage, samples of both waxed and unwaxed fruits were placed at constant temperatures of 45°, 50°, 55°, and 65°F. Respiration rates, firmness and mealiness were determined at 3-day intervals, and samples were taken for pectin and sugar analyses.

Development of mealiness in fruits of Richared Delicious was retarded appreciably by sealing in cellophane or pliofilm, but "off-flavors" developed in the latter with a change of color to a deep purple or blackish hue under some conditions. Undesirable flavor and color changes were associated with an oxygen content of 5 percent or less.

Adaptation of Fruit Varieties and New Seedlings to Maryland—The yield of certain peach varieties, particularly Early Elberta, Halehaven, and Rio Oso Gem, was reduced materially by frost. Redskin continued to show good commercial qualities of yield, growth, high bud-set, and marketability. Sunhigh and Pacemaker were excellent, but Newday lacked edible quality.

Red raspberry selections from the earlier crosses have been reduced to about 15 showing good fruit and growth qualities and having come through five consecutive winters without injury. These are all of Sunrise-March parentage. Of recent combinations, Sunrise x Oregon 549 (Viking x Lloyd George) has yielded several promising selections.

Virus Disease in Black Raspberries—Results of several consecutive years indicate that virus spread in black raspberries can be held within approximately 1 percent if careful roguing is practiced and a distance of about 1,000 feet from un-rogued commercial plantings is maintained. Cumberland and Logan varieties were planted with approximately 800 and 1,000 feet separating them from the nearest commercial plantings at the start of the test. Until the fifth year the total percent removed for all virus troubles was about 1 percent in each planting per year. When an uncontrolled commercial planting was set within 300 feet of one planting in 1944, the percent of virus increased markedly in the subsequent year. The other planting remained at the previous level.

Value of Organic Matter in Production of Vegetable Crops—Field corn was grown on each of 34 plots in 1946 to determine

the residual effects of rotations carried out in 1940 to 1942 and subsequent treatments in 1943 to 1945.

The effect of using nitrogen to grow the cover crop and also to decompose it was still evident four years after the end of the original rotation. Such treatments increased the yield of field corn significantly over treatments where nitrogen was not used to grow the cover crop.

Breeding Tomatoes for Wilt Resistance—Two selections of Brown's Special x Pan America from earlier tomato crosses continue to be outstanding in quality, appearance, yield, and resistance to Fusarium wilt. Further work is needed to fix characteristics. Semi-commercial tests of these selections should be undertaken in the near future.

Quality of Fresh Vegetables as Modified During Harvesting. Preparation for Market and Storage—Shelling lima beans and peas accelerated respiratory activity, and was reflected in more rapid loss of quality. Shelled peas lost fresh taste rapidly. Tests with vine-ripe tomatoes indicate the possibility of handling them at low storage temperatures (32° to 38°F). Tomatoes, sweet corn, and lima beans enclosed in transparent film (12 types of pliofilm and cellophane) developed off-flavors during storage, with CO_2 build-up as high as 50% and O_2 depletion to less than 1% found frequently. Discoloration of snap beans was lessened greatly by enclosing in film, without deterioration of flavor. A discoloration of sweet corn which appears on injured kernels upon boiling was prevented by an acid dip of the ears immediately after husking.

POULTRY

Development of more efficient egg and meat producing strains of chickens and turkeys, better balanced diets for more economical egg and meat production, and improved quality of eggs and poultry meat have been objectives of research carried on during the year.

Molt Retarded and Egg Production Increased by Drug with Hormone Effect—Possibility that flock owners can prolong the first-year laying period of pullets by feeding methods is indicated by results of feeding a drug called Thiouracil to New Hampshire pullets. This drug depresses the activity of the thyroid gland. The birds to which a 0.45 gram capsule was given daily for approximately 26 weeks were retarded at the outset and completion of their first annual molt compared with untreated New Hampshire pullets. Egg production was similar for the two groups except for superior production for the treated group during the last month.

Hatchability From Eggs Held in Freezing Temperatures—Sudden drops in temperature to as low as 30° F. for periods up to 10 hours should not have a deleterious effect on hatchability of eggs, according to results of tests. As good hatchability was obtained from chicken eggs held 10 hours at 30.2° F. as from comparable eggs held at 50-55° F. Better hatchability was secured from turkey eggs held at 30.2° F. for 1, 2, 3, and 4 hours, respectively, than from comparable lots of eggs held at 50-55°F.

Cycle of Laying Not Easily Changed— Many poultrymen have long felt that scaring laying birds will cause a sudden drop in egg production. White Leghorn pullets, whose laying cycle was determined at hourly intervals, were scared by various methods to determine the effect on subsequent laying. The results were negative, since all frightened hens laid at the expected time.

Efficiency of Feed Utilization—Results of a series of experiments with New Hampshires, Barred Plymouth Rocks, White Leghorns, and Cornish breeds were: 1. Males utilize feed more efficiently than females; 2. Crossbreds utilize feed more efficiently than purebreds sired by the same sire; 3. Inherent differences in feed utilization between individuals cannot be accounted for entirely on the basis of body weight, rate of gain, or time; 4. Units of feed required per unit of gain do not constitute a satisfactory measure of efficiency unless comparisons are made at the same time and weight.

Variety of Wheat May Affect Pullet Disease—It has been indicated by previous work that some varieties of wheat contain certain toxic elements that produced pullet disease or blue comb. Todd and Lansdale wheats were compared with respect to germination and the growth of bacteria and fungi. Todd wheat gave completely negative results and Lansdale wheat gave either negative or highly questionable results. Germination alone is not a satisfactory measure to determine whether it is safe to feed a certain variety of wheat with respect to its causing pullet disease.

Feather Pigment Reactions From a Drug with Hormone Effects—Observations to date of drug with hormone effects on pigmentation of feathers of Brown Leghorns are: 1. Persistence of certain properties of the plumage differentials even in long-time thiouracil treatment that commenced at about 7 weeks of age; 2. Development of some interesting interrupted patterns which in the female especially indicate fluctuating hormone levels.

Thiouracil treated fowls showed changes in body conformation toward a plumper and more blocky type. Sex differences were retained and treated hens continued to lay, although sporadically.

Red blood counts were greatly lowered and to a more marked degree in the males. Feathers were produced that were of a silky structure.

Hormones Affect Fattening—A significant increase in fat content of breast meat of growing chickens fed certain drugs having hormone effects has been demonstrated. Dimethyl ether of diethylstilbesterol was fed to New Hampshires at a level of 50 milligrams per pound of feed. Tablets of the same drug were implanted in the cheeks of comparable birds. Diansylhexene was fed at a level of 50 milligrams per pound of feed. The latter proved to be more potent from the standpoint of fattening.

Used Chick Boxes Can be Fumigated—Used chick boxes were artificially contaminated with bacterium pullorum and given a double-strength, double-time fumigation in standard forced-draft incubator. The results indicate that use of formalin at the rate of 70 c.c. of the standard 40 percent formalin per 100 cu. ft. of incubator space for 10 minutes renders chick boxes safe from the standpoint of transmission of pullorum disease.

Temperature in Some Incubators Affected by Barometric Pressure—It has been found that gas-water control of incubator temperature reduces the accuracy of temperature adjustment. A high barometric pressure compressed the wafer, resulting in a higher temperature in the incubator, whereas a low barometric pressure expanded the wafer, resulting in a lower temperature in the incubator.

Semi-Solid Vegetable Wastes as Feed for Poultry—Considerable amounts of vegetable wastes, which have a potential value for poultry, are available in Maryland and nearby states. A new feed of this type has been found to be well liked by chickens and to be an excellent source of vitamin A, as well as other nutrients. This material is made from cannery vegetable wastes and contains left-over parts of carrots, beans, tomatoes, potatoes and other good vegetables. The mixture is fermented and partially dried before feeding so that it will keep for long periods without spoiling. It is fed in a manner similar to semi-solid buttermilk.

In the experiments, the semi-solid vegetable wastes were mixed in a part of the mash daily, which gave a moistened, crumbly mash. When fed to broilers receiving a normal broiler mash, a faster growth rate was obtained than without the material. Broilers reached market size one or two weeks earlier. The birds relished the material and ate large amounts of mash with it, which probably accounts for the increased growth.

Synthetic Riboflavin Compared with Natural Riboflavin—Synthetic riboflavin was found equally effective with chickens as the same amounts of natural riboflavin in taking care of the

need for this important vitamin. Results with the synthetic riboflavin, however, were not as uniform or consistent as those with natural sources of riboflavin. This may be due to difficulties in mixing small quantities of the material in a ration.

Turkeys which received the natural riboflavin supplement (fermentation solubles) grew faster than turkeys receiving an equal amount of riboflavin supplied as the synthetic material. This was due, no doubt, to the presence of additional factors needed for growth in the natural material.

Chicks Grow Fast on Laboratory Diets—New Hampshire chicks averaged nearly one pound when 4 weeks old when given a specially-made "synthetic diet" for laboratory use. A few individual chicks went over the one pound mark at that age. The same strain of New Hampshire chicks usually weigh only one-half pound, or slightly more, at 4 weeks of age when fed ordinary starting mashes. Greater efficiency of feed utilization was obtained also on the special diet.

The "synthetic diet" used was composed of expensive, purified ingredients (28 in all) and was extremely rich in well-balanced

FIG. 1. *New Hampshire weighing one pound at only four weeks of age. Grown on a synthetic diet.*

protein, vitamins, minerals, and energy. Certain unusual carbohydrates, such as xylose or cellulose, also had to be present in order to give this unusual growth rate. Incidentally, this is the first time that cellulose, as source of fiber, has been found to have a growth-producing action for chickens.

This special diet is extremely costly and is available for laboratory purposes only. It is very useful in studying such things as maximum growth rates and vitamin, amino acid, and mineral deficiencies.

Amino Acid Imbalance Causes Pellagra in Chickens—Addition of large amounts of corn or gelatin to rations low in nicotinic acid or low in tryptophane resulted in very severe chick-pellagra. The detrimental action of these materials is now found to be due to their amino acid content. This is explained on the basis that nicotinic acid appears to be needed for the metabolism of amino acids, especially arginine, glycine, proline, glutamic acid, leucine, and alanine.

When high amounts of these amino acids are present in practical rations, special precautions must be taken to make certain that sufficient nicotinic acid, or tryptophane, is present. Such a condition arises when large amounts of corn and its products and meat scraps are used.

Unknown Growth Factor Replaces Pantothenic Acid—Chickens need pantothenic acid, which is a vitamin of the B

FIG. 2. *A New Hampshire chicken four weeks old showing lack of the pantothenic acid vitamin in the diet. Note skin sores about the mouth and eyelid. Poor growth and poor feathering also result from a deficiency of this vitamin.*

complex, for normal growth, feathering, and for prevention of skin sores in the corners of the mouth and on the eyelids. Practical poultry rations contain an abundance of this vitamin, although a few cases of pantothenic acid deficiency have been seen in the field.

It was found that feeding livermeal to chickens reduced the amount of this vitamin needed in the diet. It was concluded that the substance in livermeal could not be pantothenic acid because it could not be tested by the usual microbiological methods. The unknown substance is stable to alkali treatment, but not to strong acid. Attempts to concentrate the factor, based on treatment with norite and on alcohol fractionation, have proved fairly successful. The substance may be an important source of pantothenic acid in practical diets.

Farm Egg Cooling Systems—Two egg cooling boxes have been remodeled and tested under normal room temperatures. One of these is a mechanical refrigeration box, and the other is cooled by evaporation of water passing over an area which has a maximum amount of exposed surface. Extensive tests of these boxes will be made. Work to date has shown that it is not advisable for producers to place dirty eggs in the cooler before cleaning, as it is much harder to remove dirt from cooled eggs.

Handling Dressed Poultry—It has been determined that fresh-dressed broilers and fryers can be held in ice-packed retail display cases for 10 days without showing signs of deterioration, if proper icing methods are used. Fresh-killed, eviscerated broilers and fryers can be held in such cases for 7 days without showing noticeable spoilage with proper icing. Room temperature has relatively little effect on the interior temperature of dressed poultry packed in ice, if proper icing methods are used.

PUBLICATIONS

BULLETIN

Number	Title	Authors
A 43	Improving Farm Income Tax Reporting.	W. P. Walker, S. H. DeVault

SCIENTIFIC JOURNAL ARTICLES

Number	Title	Authors
A 134	The Microflora of Wheat Feeds as Related to the Incidence of Blue Comb in Chickens. *Poultry Science*	M. A. Petty, G. D. Quigley
A 135	Chromosome Morphology in Lilium. *American Journal of Botany.*	R. N. Stewart
A 136	Effect of Proteins Low in Tryptophane on Growth of Chickens and on Laying Hens Receiving Nicotinic Acid-Low Rations. *Journal of Nutrition.*	G. M. Briggs, A. C. Grosche, R. J. Lillie
A 137	Inhibitory Action of Certain Amino Acids on Chicks Receiving Nicotinic Acid-Low Diets. *Journal of Biological Chemistry.*	A. C. Grosche, G. M. Briggs
A 138	The Effect of Different Post-Storage Temperatures on the Firmness and Condition of Richared Delicious. *Proceedings American Society for Horticultural Science.*	I. C. Haut
A 139	Summary Report of Twenty Years of Root-Stock Work with Tree Fruits at Maryland Agricultural Experiment Station. *Horticultural Science.*	A. L. Schrader
A 140	Plumage Sequence in a Case of Hemi-Lateral Asymmetry in Male Hybrid Fowl. *Physiological Zoology.*	Mary Juhn
A 141	The Relation of the Plumage Tract Gradients to the Serial Localization of Feather Pigments in a Hybrid Cock. *Physiological Zoology.*	Mary Juhn, C. W. Hess
A 142	Violet Scab Widely Distributed in Maryland. *Plant Disease Reporter.*	R. A. Jehle, E. A. Walker, Anna E. Jenkins
A 143	The Effect of Barometric Pressure Changes Upon Temperature Control in Incubators Equipped with Gas Wafer Thermostats. *Poultry Science.*	G. D. Quigley
A 144	Folic Acid Requirements of New Hampshire Chicks Receiving Snythetic Diets. *Poultry Science.*	R. J. Lillie, G. M. Briggs
A 145	Biological Assay of Folic Acid Activity in Common Feeding stuffs. *Poultry Science.*	R. J. Lillie, G. M. Briggs
A 147	Experiments with Liquefied Gas Aerosols for Control of Insects on Eggplant and Broccoli. *Journal of Economic Entomology.*	H. B. Owens, L. P. Ditman, G. J. Burkhardt
A 149	The Effects of Thiouracil on Feather Pigment Determination in Hybrid Fowl. *Journal of Heredity.*	Mary Juhn
A 150	Sickle and Feather Growth in Thiouracil-Treated and in Japanese Long-Tailed Chickens. *Journal of Heredity.*	Mary Juhn, M. A. Jull

Number	Title	Authors
A 151	A Technique for Intravenous Feeding of Ruminants with Some Observations on the Effect of Intravenous and Abomasal Administration of Various Substances Upon the Secretion of the Lower Fatty Acids of Milk Fat. *Journal of Dairy Science.*	A. I. Mann J. C. Shaw
A 152	Factors Influencing the Keeping Quality of Dehydrated Apples. *Proceedings of the American Society for Horticultural Science.*	A. L. Shrader A. H. Thompson
A-153	The Nutritive Value of Canned Foods XXIV. Effect of Duration and Temperature of Blanch on the Proximate and Mineral Composition of Certain Vegetables. *Industrial and Engineering Chemistry.*	A. Kramer Mary K. Smith
A 154	Atmospheric Changes Occurring in Film Wrapped Packages of Vegetables and Fruits. *Proceedings of the American Society for Horticultural Science.*	L. E. Scott Salah Tewfik
A 155	A Final Report on Studies of Tomato Fruit Cracking in Maryland. *Proceedings of the American Society for Horticultural Science.*	W. A. Frazier J. L. Bowers
A 156	Growth Inhibitory Action of Amino Acids in Nicotinic Acid-Low Diets for Chicks. *Federation Proceedings.*	A. C. Grosche J. O. Anderson G. M. Briggs
A 157	Additional Records on Distribution of Plantain Scab (*Sphaceloma Plantaginis Jenkins & Bitanc*) *Plant Disease Reporter.*	R. A. Jehle E. A. Walker D. A. Preston Anna E. Jenkins
A 158	Studies on Folic Acid in the Prevention of Abnormal Feather Pigmentation. *Poultry Science.*	R. J. Lillie G. M. Briggs
A 159	Fiber Content of Canned Green Asparagus. *The Canner, Canning Trade* and *Food Packer.*	H. R. Smith Amihud Kramer
A 160	Electrophotometric Methods for Measuring Ripeness and Color of Canned Peaches and Apricots. *Journal of Food Technology.*	A. Kramer H. R. Smith
A 161	Ascorbic Acid Content and Sugar-Acid Ratios of Fresh Fruit and Processed Juice of Tomato Varieties. *Proceedings of the American Society for Horticultural Science.*	L. E. Scott E. P. Walls
A 162	Quality Comparisons of Strawberry Varieties as Affected by Processing with the Freezing Method. *Proceedings of the American Society for Horticultural Science.*	A. L. Schrader D. H. Scott
A 163	Ascorbic Acid Content of Strawberry Varieties Before and After Processing by Freezing. *Proceedings of the American Society for Horticultural Science.*	L. E. Scott A. L. Schrader
A 164	Unidentified Growth Factors for Lactobacillus Lactis in Refined Liver Extracts. *Journal of Biological Chemistry.*	Mary S. Shorb
A 165	The Growth-Promoting Action of Cellulose in Purified Diet for Chicks. *Journal of Nutrition.*	F. Davis G. M. Briggs
A 166	A Comparison of the Behavior of Injected Theelin in the Feathering of Thyroidectomised and Thiouracil-Treated Brown Leghorn Capons. *Poultry Science.*	Mary Juhn
A 167	Two Cases of Twin Chicks with a Single Umbilical Cord and Yolk. *Poultry Science.*	C. W. Hess Mary Juhn M. A. Jull

MISCELLANEOUS PERIODICALS, REPORTS, PROCEEDINGS, ETC.

Number	Title	Authors
50	Farm Production Adjustments for 1947 in Maryland. *Mimeographed Circular.*	S. H. DeVault A. B. Hamilton
51	Liquefied Gas Aerosols for Pea Aphid Control—Third Report. *Journal of Economic Entomology.*	L. P. Ditman F. F. Smith G. J. Burkhardt
52	Comparative Census of Maryland Agriculture by Counties. *Planographed Circular.*	A. B. Hamilton
53	Performance of Hybrid Corn in 1946. *Planographed Circular.*	R. G. Rothgeb
54	The Origin and Destination of Fruit and Vegetables Produced in Maryland. (Mimeographed Circular)	P. R. Poffenberger S. H. DeVault
55	Sweet Corn Field Trials in 1946. *Mimeographed Circular.*	R. G. Rothgeb
56	Fertilizer Applications to Deciduous Fruit Trees and Small Fruits. *National Joint Committee on Fertilizer Applications.*	A. L. Schrader

CURRENT PROJECTS

AGRICULTURAL ECONOMICS

A-18. Organization, Operation and Business Analysis of Maryland Farms.

- A-18-u. Farm Management Adjustments and Factors Encountered by Farmers in Attaining Increased Production.
- A-18-w. Trends in Farm Mortgage Financing in Maryland.
- A-18-x. Father-Son Partnership Arrangements in Maryland.
- A-18-y. The Economic and Social Status of Rural Negro Families in Maryland.
- A-18-z. Labor Utilization in Dairy Buildings.
- A-18-aa. Insurance Coverage Carried by Farmers.
- A-19-d. Problems in Farm Income Tax Reporting and Record Keeping.
- A-19-g. Forest Taxation in Maryland.
- A-19-h Status and Improvement Needs of Rural Roads.
- A-26-j. The Effect of Changes in Transportation on Marketing Systems for Maryland Farm Products.
- A-26-l. Prices Paid by Farmers for Commodities Bought.
- A-26-n. Problems in Marketing in the Postwar Period.
- A-32-f. Farm Tenancy and Leasing Arrangements in Maryland.
- A-32-g. Inflationary Movements in the Farm Real Estate Market.

AGRICULTURAL ENGINEERING

H-46. Concentrated Sprays. (In cooperation with Entomology.)
R-6. Investigations of Grain Storage on the Farm.
R-9. Sweet Potato Curing and Storing.
R-10 Drying Hay with Heated Air.

AGRONOMY

B-39. Wheat—Hybridization and Selection.
B-41. Barley—Hybridization for Smooth Awns.
B-42. Hay, Forage and Pasture Crops.
B-43. Soybean Production in Maryland.
B-44. Sweet Corn—Seed Production and Breeding.
B-49. Improvement of Pastures in the Several Soil Provinces of Maryland.

B-50. Development of Dent Corn Hybrids Specifically Adapted to the Corn-Growing Areas of Maryland.

B-52. Effects of Different Short Rotations on Physical, Chemical and Pathological Conditions in the Soil and on Crop Production.

B-53. Curing of Maryland Tobacco.

B-54 Date of Seeding Certain Legumes in Maryland.

O-27. Field Studies of the Fertility Requirements and Management of Important Soil Types in Maryland.

O-28-b. A Study of the Formula and Analysis for Late Potatoes.

O-33. Efficiency of Soil Fertility Management.

O-43. Hydrologic Studies with Reference to Soil Moisture Conservation, Soil Fertility and Flood Control.

O-44. A Biochemical-Biological Study of Means to Increase the Organic Colloidal Complex of the Soil.

O-44-a. A Study of the Chemical and Physical Changes Produced in a Soil by the Formation of the Organic Colloidal Complex.

O-45-a. Soil Fertility Studies at the University Farms.

O-45-b. A Study of the Availability of Phosphate Material.

O-47. The Available Supplies and Relative Agricultural Values of By-Product Liming Materials of Eastern Maryland.

O-47-a. A Study of the Lime Needs and Reactions in Maryland Soils.

O-47-b. A Study of Neutralization Value of Slag for Maryland Soils.

O-48 A Study of the Reclassification of Soils and the Adaptation of these Classifications to Soil Conservation Work in Maryland.

O-49 A Study of the Effect of Fertilizer, Boron, Minor Elements on the Stand, Yield and Composition of Alfalfa.

—— Production of Grain Sorghums.

—— The Improvement, Production and Use of Rye in Maryland. (Coop. with Maryland Distillers.)

AGRONOMY—SEED INSPECTION

N-7. Inspection of Seeds Sold Throughout the State.

N-8. Examination of Samples from Seeds Sold Throughout the State.

N-9. Examination of Samples Submitted to the Laboratory.

ANIMAL HUSBANDRY

C-6. Study of the Factors which Influence the Production of Cured Pork Products of Desirable Quality and Palatability.

C-8. Swine Breeding Investigations Within the State of Maryland.

C-11. Wintering Rations for Pregnant Beef Cows.

C-12. The Influence of Energy Intake on the Performance of Breeding Ewes.

C-13. The Relative Value of Barley and Wheat Hays Compared to Mixed Clover-Light Timothy Hay in the Winter Rations, etc.

ANIMAL PATHOLOGY

D-44. Bovine Trichomoniasis—Diagnosis, Treatment, Control and Eradication.

D-46. Bang's Disease—Calfhood Vaccination.

D-48. The Formulation of a Control Program Against Fowl Cholera.

D-49. Diagnostic Tests Including Hematology in Swine Brucellosis and Capsule Formation in Brucella.

D-50. Anaplasmosis of Cattle.

D-51. Experiments with Infectious Enterohepatitis (Blackhead) of Turkeys.

D-53. Role of Disturbances in the Acid-Base Balance in the Parturient and Their Significance in the Cause of Milk Fever and Ketosis (Acetonemia).

D-54. A Study of Infectious Bovine Mastitis; its Control and Eradication and the Economic Losses Attending.

BOTANY

F-9. Cytogenetic Studies in the Genera Ipomoea, Gladiolus, and Tulipa.

F-11. The Occurrence and Use of Haploid Plants Resulting from Twin Seedlings of Pepper, Cantaloupe and Other Vegetable Plants of Importance to Maryland Growers.

F-12. The Native Plants of Maryland, Their Occurrence, Distribution and Economic Importance.

F-14. The Causes of Failure During Seed Formation as a Result of Inbreeding and Hybridization in Studies of Some Maryland Crop Plants.

F-14-a. Failure of Seed Formation in Reciprocal Crosses Between Double Haploid Peppers.

F-14-b. Some Sterility Problems in Strawberry Varieties Used in a Red Stele Resistance Breeding Program.

J-72. Potato Improvement and Disease Control.

J-78. Diseases of Fruit Crops.

J-78-a. Breeding Strawberries for Resistance to the Red Stele Disease Caused by *Phytophthora fragariae* Hickman.

J-80-a. Disease Resistance in Potatoes with Special Reference to Wilt and Late Blight.

J-83. Studies on Transmissibility of the Mild Streak Disease of Black Raspberries.

J-85. The Effect of Hormone and Chemical Treatments on Breaking the Rest Period of Seed Potatoes.

J-86. Control of Stem Rot of Sweet Potato by Sprout Treatment.

J-87. Treatments for Control of Seed and Soil-Borne Diseases of Vegetable Crops.

J-88. Development of Identification and Control Procedures for Plant Virus Diseases in Maryland.

K-7. Physiological and Biochemical Aspects of Vegetable Storage.

DAIRY HUSBANDRY

G-11. Growth Data of Dairy Animals from Birth to Freshening Age.

G-30. Reproductive Efficiency in Dairy Cattle.

G-34. Chemical Changes in Milk Fat as Related to the Flavor of the Milk.

G-35. The Analysis of Dairy Products.

G-37. The Feeding and Management of the Cow During the Dry and Freshening Period.

G-37-a. Metabolic Studies on Cows with Ketosis.

G-38. The Fat Metabolism of the Mammary Gland.

ENTOMOLOGY

H-29. Investigations of the Biology and Control of Insects Affecting Canning Crops.

Sub. 5. Timing of Pea Aphid Treatments.

H-35. Nursery Insects.

H-40. Biology and Control of Tobacco Insects.

Sub. 1. The Tobacco Horn Worms.

H-41. Biology and Control of the Japanese Beetle.

H-43. The Biology and Control of the European Corn Borer Under Maryland Conditions.

H-45. Practicability of Migratory Bee-Keeping in Maryland.

H-46. Concentrated Sprays.

H-47. The Utility of Dichlorodiphenyl Trichloroethane (commonly designated as DDT) in the Control of Poultry Ecto-Parasites.

H-48. The Coddling Moth.

H-50. The Biology and Control of the Pests of Commercial Floriculture.

H-51. The Effect of DDT on Aquatic Life.

H-52. The Effect of Various Formulations of DDT on Plant and Animal Development.

HORTICULTURE

L-68. Factors Affecting Maturity, Shipping and Storage Quality of Fruits.

L-72. Relation of Soil Moisture, Age of Plants, Size of Plants, Spacing of Plants and Use of Mineral Nutrients to Flower Differentiation, Fruit Yield and Quality of the Strawberry.

L-72-a. The Economic Application of Plant Thinning and Renewal Methods in Commercial Strawberry Areas in Maryland.

L-73. Adaptation of Fruit Varieties and New Seedlings to Maryland.

L-74. Environmental Factors and Cultural Practices in Relation to the Growth and Fruiting Responses of Fruit.

Q-58. Factors Influencing Yield and Quality in the Production and Processing of Vegetables.

Q-58-a. The Influence of Fertilizer Placements and Analyses on the Yield and Quality of Vegetables Grown for Processing.

Q-58-b. Grading Raw Products.

Q-58-d. Factors Influencing Yield and Quality in the Production and Processing of Vegetables.

Q-67. The Value of Organic Matter in the Production of Vegetable Crops.

Q-74. A Study of Regional Adaptation of Certain Vegetable Crops and Varieties in Maryland.

Q-75. The Effect of Certain Factors on the Growth of Tomato Plants and the Quality of the Fruit.

Q-76-a. Breeding New Strains of Vegetable Crops.

Q-76-c. Breeding and Selection of a Fruitful Type of Lima Bean for Maryland.

Q-77. Crop Management Studies with Vegetable Crops.

Q-79. Basic Physiological Nutrition of Horticultural Plants in Relation to Plant Behavior, Fruitfulness, Etc.

Q-79-a. Cation-Boron Relationships in Sweet Potato Nutrition.

Q-79-b. The Mineral Levels and Interrelationships of Mineral Nutrients in Fruit Plantings of Maryland.

Q-80. Basic Physiological Studies on the Quality of Fresh Vegetables as Modified by Various Factors During Harvesting, Preparation for Market and Storage.

POULTRY

M-32. Physiology of Reproduction of Poultry.

M-32-g. Hormones and Molting in the Domestic Fowl.

M-32-h. Hatchability Studies in Poultry.

M-32-i. Effect of Disturbance Upon Oviposition in the Domestic Fowl.

M-33. Factors Affecting Quality of Poultry Products.

M-33-c. The Grading of Dressed Poultry as Affected by Body Type and Other Factors.

M-33-d. A Study of Farm Egg-Cooling Systems.

M-33-e. Deterioration in Eggs in Relation to Time and Temperature Changes and a Study of Thermostabilizing Processes.

M-33-f. Changes in Grades of Eggs in Carlot Shipments in Relation to Season, Shipping Distance, Temperature, Time and Other Factors.

M-34. The Efficiency of Poultry in the Utilization of Feed.

M-34-d. By Progeny-test and Breeding Methods, Developing Strains of Purebred and Crossbred Poultry Excelling in Efficiency of Feed Utilization, etc.

M-34-e. Medium Sized Strain of Turkeys with Certain Desirable Qualities.

M-35. Nutritive Requirements of Poultry.

M-35-g. The Requirement of the Growing Chick for Newer Members of the Vitamin B Complex.

M-35-h. Nutritive Deficiencies in Corn.

M-35-i. Amino Acids in Poultry Nutrition.

M-36. Viability of Maryland Poultry.

M-36-d. Developing a Possible Test for the Presence of Avian Leucosis.

M-36-e. The Role of Wheat in Pullet Disease of Chickens.

M-36-f. Response in Feathering in Hybrid and Purebred Fowl Fed Selenium as a Check on Feather-Pigment Reactions Due to Leucosis.

M-36-g. Effect of Long-Time Thiouracil Treatment on Feather Pigmentation in Brown Leghorns and Other Breeds and Hybrids as a Further Check on Feather-Pigment Reaction Due to Leucosis.

M-38. Gas Fumigation for Used Baby Chick Boxes.

M-41. Studies on the Possibility of Distinguishing by Plumage Markings Between Homozygous and Heterozygous Barred Plymouth Rock Males Used in Hatchery Flocks.

M-42. The Effect of Brooding Environment Upon Poultry.

M-43. Effect of Hormones on Plumage, Growth, Fattening and Other Characteristics in Poultry.

M-43-a. Relations of Thymus to Induced Molt.

M-43-b. Determining Feather Genotype Through Hormone Effects in Lieu of Breeding.

M-43-c. Effect of Thiouracil and Other Hormones on Growth in Chickens.

CHANGES IN PERSONNEL

Appointments:

J. O. Anderson, Assistant in Poultry Husbandry, September 6, 1946
E. K. Bender, Asst. Prof. Horticulture, May 1, 1947
William Crow, Assistant in Animal Husbandry, September 1, 1946
Ellen P. Emack, Assistant in Agronomy, September 26, 1946
Hugh G. Gauch, Assoc. Prof., Botany, September 1, 1946
J. E. Hawes, Res. Asst., Horticulture, February 16, 1947
Norman Horn, Assistant in Botany, September 1, 1946
E. S. Irwin, Assistant in Botany, July 1, 1946
G. W. Newell, Assistant in Poultry Husbandry, September 1, 1946
J. J. Smoot, Assistant in Botany, July 1, 1946
F. C. Stark, Jr., Asst. Prof. Veg. Gardening, Horticulture, May 1, 1947
David Stoddard, Assistant in Botany, December 1, 1946
Robert E. Swope, Assoc. Prof., Animal Pathology, September 1, 1946

Resignations:

Fred H. Leinbach, Prof. and Head, Animal Husbandry, January 1, 1947
G. F. Madigan, Asst. Prof., Soils, February 14, 1947
DeVoe Meade, Professor, Animal Husbandry, October 1, 1946
J. T. Mullady, Seed Analyst, Agronomy, January 31, 1947
Mary Smith, Res. Asst., Horticulture, January 15, 1947
C. C. Stepanek, Assistant in Horticulture, May 1, 1947
R. N. Stewart, Asst. Prof., Botany, September 30, 1946

FINANCIAL STATEMENT—JULY 1, 1946 TO JUNE 30, 1947

	FEDERAL FUNDS				
	Hatch	Adams	Purnell	Bankhead-Jones	
Balance June 30, 1946			$ 24.47		
Appropriations for 1946-47	$15,000.00	$15,000,00	59,975.53	$32,781.37	
Totals	$15,000.00	$15,000.00	$60,000.00	$32,781.37	
Receipts from sources other than Federal 1946-47				For Agr. Investigations*	
State Appropriations for agricultural investigations					$106,529.00
Industrial Grants					52,207.50
Sales and Miscellaneous					72,590.15
					$231,326.65
Balance brought forward July 1, 1946					55,304.07
Total					$286,630.72
Expenditures:-					
Personal Services	$12,305.50	$12,471.06	$45,602.08	$23,952.56	$109,219.37
Travel	647.70	915.68	1,377.76	553.58	2,780.24
Transportation	.65	2.38	34.43	11.79	874.44
Communication Service			57.00		1,255.16
Rents and Utility Services			44.92	114.62	1,391.83
Printing and Binding			706.98	95.00	830.62
Other Contractual Services	25.47	75.00	1,405.16	706.40	10,050.97
Supplies and Materials	1,931.95	1,090.07	7,939.94	6,078.96	56,436.28
Equipment	88.73	445.80	2,831.73	1,268.45	21,636.55
Land and structures					7,606.47
Contributions to Retirement					
	$15,000.00	$14,999.99	$60,000.00	$32,781.36	$212,081.93
		.01		.01	74,548.79
	$15,000.00	$15,000.00	$60,000.00	$32,781.37	$286,630.72

*Including Bankhead-Jones Offset Funds.

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